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Sommer in the training of defective children and he believes that all of the results, even the extraction of roots, can be understood in that light.

It is evident from these selected articles that the Fortschritte continues its early high standard in the quality and variety of articles that it presents and must be assigned an important place among current psychological publications.

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Bodily Changes in Pain, Hunger, Fear, and Rage. An Account of Recent Researches into the Function of Emotional Excitement. WALTER B. CANNON. New York and London: D. Appleton and Company. 1915. Pp. xiii + 311.

The results of Professor Cannon's investigations are already familiar to the readers of this JOURNAL. Previous experimenters had shown that fear, anger, and pain inhibit the flow of gastric juice and saliva; Cannon found that stomach contractions were also inhibited by these experiences. He and his pupils have demonstrated that such excitements increase the discharge of adrenin into the blood, and have confirmed the suggestion derived from other investigators that emotional excitement increases the amount of blood sugar. They have shown that in pain and emotional excitement innervation of the sympathetic nervous system, "probably aided by the adrenal secretion simultaneously liberated," affects the blood pressure in such a way that the blood is driven out of "the vegetative organs of the interior, which serve the routine needs of the body, into the skeletal muscles which have to meet by extra action the urgent demands of struggle or escape," and the heart, lungs, and brain whose activity must also be increased. They have experimentally demonstrated that adrenin counteracts the results of muscular fatigue by an influence not wholly derived from its effect on blood pressure, and have shown that it produces faster coagulation of the blood, an assertion previously disputed. The general conclusion which is obviously indicated is that emotional excitement serves a purpose of great usefulness to the organism. Sugar, the fuel needed for intense bodily exertion, is automatically poured into the blood; the supply of blood is sent by the change in blood pressure where it is most needed; muscular fatigue is counteracted and the danger of bleeding to death from wounds lessened by the action of adrenin on coagulation.

The chapter on hunger is a less essential part of the main argument of the book. It reports an experimental proof of the fact that the sensation of hunger is occasioned by the contractions of the empty stomach.

While the demonstration that the physiological effects of pain, fear, and rage are of great service to the organism in times of supreme stress is of deep scientific interest, its immediate appeal is to the physiologist and biologist. More directly the concern of the psychologist is the chapter on "The Interrelations of Emotions." The author points out that the opposition between the functions of the middle or sympathetic division of the autonomic nervous system and the two distal divisions, the cranial and the sacral, is reflected in an antagonism between the emotional experiences expressed through these divisions. "The cranial autonomic—is concerned with the quiet service of building up reserves and fortifying the body against times of stress. Accompanying these functions are the relatively mild pleasures of sight and taste and smell of food. The possibility of existence of these gentle delights of eating and drinking and also of their physiological consequences is instantly abolished in the presence of emotions which activate the sympathetic division" (p. 268). In like manner the sexual emotions, depending on the sacral division, are abolished by pain, fear, or rage.

The author concludes from the similarity of the visceral effects of rage and fear that visceral influences are too undifferentiated to account for differences in the felt quality of emotions; and adds this consideration to Sherrington's observation that dogs with the visceral influences eliminated showed characteristic facial and vocal evidences of different emotions, as proving the relative unimportance of the visceral factors for the psychology of emotion. It should be carefully noted that this does not in the least mean an overthrow of the James-Lange theory of emotion. According to James and Lange, the emotion is caused by motor phenomena occurring not only in the viscera, but in the skeletal muscles as well. It may well be urged that in so far as the visceral disturbances get the leading rôle in very violent emotion and are uniform for different kinds of emotion, just so far do the different kinds come to feel alike and really to be the same emotion. As for Sherrington's dogs, rage in a normal dog, it may be argued, consists in the sensations from visceral changes, from facial expression, and from barking; if the visceral changes are prevented from occurring, the fact that the other motor effects persist does not prove that the dog's subjective state is just what it would normally be. To assume that because the dog can still bark, the subjective condition of rage is present unaffected by the loss of visceral influences is to assume, not to prove, the very point which the James-Lange theory would deny, namely, that a motor process like barking is merely an effect of a preexistent subjective state of emotion, instead of being one of the causes of the state.

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